VERIFICATION OF ENGLISH TRANSLATION OF PRIORITY DOCUMENT

I, Yukiko Sugimoto of c/o TANABE PATENT OFFICE, Green-Fantasia Building 5th Floor, 11-11-508, Jingumae 1-chome, Shibuya-ku, Tokyo 150-0001 JAPAN, am well versed in the English and Japanese languages and I hereby verify that the following is the true and correct translation of Japanese Patent Application No. P8-249381 to the best of my knowledge, information and belief.

Yukiko Sugimoto
(Signature of Translator)

3/8/2001
(dated)

[Name of Document] SPECIFICATION

[Title of Invention] METHOD AND APPARATUS FOR PROCESSING IMAGE

[Scope of Claim for a Patent]

[Claim 1]

A method for processing an image comprising:

a forming step for forming a fat clip including work information when a resultant clip is formed by carrying out at least one process of the processes of editing, composition or special effect relative to a prescribed component clip every module, the resultant clip formed correspondingly to said work information and information related to said component clip used for forming said resultant clip, and including the information of other fat clip as said component clip when other fat clip is employed as said component clip; and

a rerunning step for retrieving a second fat clip associated with a first fat clip when the first fat clip is corrected and rerunning a process corresponding to the work information of said second fat clip so that the resultant clip of the second fat clip is formed again.

[Claim 2]

A method for processing an image according to Claim 1, wherein said forming step further includes a step of writing an identifier of other fat clip as said component clip in said fat clip.

[Claim 3]

A method for processing an image according to Claim 1, wherein said forming step further includes a step of writing an identifier of said module forming said fat clip in said fat clip.

[Claim 4]

A method for processing an image according to Claim 1, further comprising a reading step of reading a prescribed module forming a prescribed fat clip when the prescribed fat clip is selected in the prescribed module.

[Claim 5]

A method for processing an image according to Claim 1, further comprising an identifying step of applying an identification symbol for identifying from a third fat clip which is not related to said first fat clip to said second fat clip.

[Claim 6]

An apparatus for processing an image comprising:

a forming means for forming a fat clip including work information when a resultant clip is formed by carrying out at least one process of the processes of editing, composition or special effect relative to a prescribed component clip every module, the resultant clip formed correspondingly to said work information and information related to said component clip used for forming said resultant clip, and including the information

of other fat clip as said component clip when other fat clip is employed as said component clip; and

a rerunning means for retrieving a second fat clip associated with a first fat clip when the first fat clip is corrected and rerunning a process corresponding to the work information of said second fat clip so that the resultant clip of the second fat clip is formed again.

[Detailed Description of the Invention]

[0001]

[Industrial Field of Utilization]

The present invention relates to a method and an apparatus for processing an image, and more particularly to a method and an apparatus for processing an image in which a fat clip including the identifier of a component clip is formed so that a process corresponding to the work information of other resultant clip associated with a corrected resultant clip is reexecuted and its resultant clip is automatically formed again.

[0002]

[Prior Art]

When a video image is edited, three basic processes such as the editing, composition or synthesis and special effect of an animated image are carried out. In recent years, these processes including editing, composition and special effect

have been performed by using a computer and controlling a video device through its software and GUI (Graphical User Interface).

[0003]

In most cases, the software and GUI for carrying out the processes of editing, composition and special effect have been divided into modules every function. This has been carried out because of below mentioned reasons.

[0004]

1. A complicated and large scale development can be divided into small scale developments by dividing the software and GUI into modules and the development can be easily performed. Further, a development work can be divided into jobs.

[0005]

2. Since the software and GUI are divided into modules every function, an influence applied to a whole system can be minimized when a new function is added or a conventional function is changed. Therefore, the change and addition of a function are facilitated.

[0006]

3. In order to create images by different techniques for respective times,it is desirable to divide each function so that a user can apply respective functions to an image in a different order every time.

[0007]

Fig. 15 shows a conventional method for editing a video

image. In this specification, when it is not necessary to especially discriminate between the processes, the three processes of editing, composition and special effect are also called simply an editing process.

[0008]

A user initially prepares a component clip in step S101. For example, in an example shown in Fig. 16, component clips MC1 to MC3 are prepared for forming a clip (resultant clip) A and component clips MC4 to MC7 are prepared for forming a clip (resultant clip) B.

[0009]

Then, the user processes the component clips MC1 to MC3 in accordance with a processing module a so that the user forms the clip A as the resultant clip in step S102. The user similarly applies a processing module b to the component clips MC4 to MC7 so that the user forms the clip B as the resultant clip in step S 103.

[0010]

Further, in step S104, the user processes the clip A formed in the step S102 and the clip B formed in the step S103 in accordance with a processing module c so that he forms a clip C as a resultant clip. In the example shown in Fig. 16, the clip A and the clip B are subjected to a wiping processing so that a gradually changed image is formed as the clip C.

[0011]

In the forming operation of an image, it has been frequently desired to add a change to a prescribed image formed once.

[0012]

Thus, whether the clip A or the clip B needs to be changed or not is decided under a state in which the clip C is completed as mentioned above in step S105. For example, when it is decided that the clip A needs to be changed,the user advances to step S 106. The user selects the processing module a (changes a mode to the mode of the processing module a), suitably changes the component clip in step S107 and then forms anew the clip A in accordance with the processing module a.

[0013]

Further, it is decided that the clip B needs to be changed, the user advances to step S108 and selects the processing module b (changes a mode to the mode of the processing module b). Then, the user suitably changes the component clip in step S109, and forms the clip B by applying the processing module b to the component.

[0014]

In such a way, when the user changes the clip A or the clip B, the user further returns to the step S104 and applies the processing module c to the newly formed clip A and clip B so that he forms a new clip C.

[0015]

[Problems to be Solved by the Invention]

As described above, in the conventional editing method, when a work in a lower rank module needs to be corrected after a plurality of processing modules are used, an editing work is hierarchically performed and a resultant clip is formed in a prescribed upper rank module, a user must remember the module generating the clip (For example, when a clip A is corrected, a user remembers a processing module forming the clip A as a processing module a) and reread the processing module (change a mode to the processing mode of the processing module a). When the number of clips is small, it has not been so hard for the user to remember the processing modules generating the clips, however, when there are several tens or several hundreds of clips, it has been substantially impossible for the user to remember the processing modules of all the clips.

[0016]

In addition, when the processing of the lower rank module is corrected (changed), works in processing modules of upper ranks or layers from the above described rank or layer (a clip associated with a resultant clip generated in the rank or layer is referred to as a component clip) need to be manually carried out again by the user. In the example shown in Fig. 15, when a process in the processing module a or the processing module b is changed, a process in the processing module c in a rank or layer higher than the above described processing module must be

manually executed again by the user. When a complicated image is created, many ranks or layers are required. Thus, if the work made once needs to be completely tried again, much labor and time will be needed.

[0017]

Fig. 17 illustrates a display example of GUI of Advance of Avid Corporation. The left half part of this display example serves as an editing area and the right half part thereof serves as a special effect area. A part below these areas serves as a button area in which buttons operated when various kinds of operations are selected and commanded are displayed. In the editing and special effect areas, inputs for an editing processing and for a special effect processing can be respectively carried out. In the special effect area, component clips MC11 to MC16 are connected to boxes B1 to B4 which carry out a prescribed basic special effect image processing by straight lines so that a desired special effect process can be input to these component clips. Further, in this special effect area, when the prescribed component clip or box is changed within the module of special effect, a work therefor can be automatically rerun and a resultant clip can be obtained.

[0018]

However, a work cannot be automatically rerun in order to apply the influence of a change carried out in one of the editing area and the special effect area to the other. Namely,

the work cannot be rerun between different modules.

[0019]

Therefore, in this case, when the process of the module of a specially lower rank or layer of the modules of many ranks is modified, the editing work needs to be substantially completely tried again from a first part and long labor and time are required for the editing work, in order to finally obtain a resultant clip. This disadvantageously has resulted in a high cost.

[0020]

The present invention was made by taking the above mentioned circumstances into consideration and enables the editing work to be simplified and the cost to be lowered.

[0021]

[Means for Solving the Problems]

A method for processing an image according to Claim 1 comprises:

a forming step for forming a fat clip including work information when a resultant clip is formed by carrying out at least one process of the processes of editing, composition or special effect relative to a prescribed component clip every module, the resultant clip formed correspondingly to said work information and information related to the component clip used for forming the resultant clip, and including the information

of other fat clip as the component clip when other fat clip is employed as the component clip; and a rerunning step for retrieving a second fat clip associated with a first fat clip when the first fat clip is corrected and rerunning a process corresponding to the work information of the second fat clip so that the resultant clip of the second fat clip is formed again.

[0022]

An apparatus for processing an image according to Claim 6 comprises: a forming means for forming a fat clip including work information when a resultant clip is formed by carrying out at least one process of the processes of editing, composition or special effect relative to a prescribed component clip every module, the resultant clip formed correspondingly to the work information and information related to the component clip used for forming the resultant clip, and including the information of other fat clip as the component clip when other fat clip is employed as the component clip; and a rerunning means for retrieving a second fat clip associated with a first fat clip when the first fat clip is corrected and rerunning a process corresponding to the work information of the second fat clip so that the resultant clip of the second fat clip is formed again.

[0023]

In the method for processing an image according to Claim 1 and the apparatus for processing an image according to Claim

6, the fat clip including the work information m, the resultant clip and the information associated with the component clip is formed. When other fat clip is used as the component clip, the information of other fat clip employed as the component clip is included in this fat clip. When the first fat clip is corrected, the second fat clip is retrieved, and the work information is rerun so that the resultant clip of the second fat clip is newly formed.

[0024]

[Embodiments]

The embodiments of the present invention will be described hereinbelow. In order to make clear the corresponding relation between the respective means or steps of the invention described in Claims and the below mentioned embodiments, the features of the present invention will be described below by adding a corresponding embodiment (one embodiment) into parentheses after each means. It should be noted that this description be not limited to one in which the respective means are described.

[0025]

A method for processing an image according to Claim 1 comprises:

a forming step (for example, step S52 of Fig. 8) for forming a fat clip including work information when a resultant clip is formed by carrying out at least one process of the

processes of editing, composition or special effect relative to a prescribed component clip every module, the resultant clip formed correspondingly to the work information and information related to the component clip used for forming the resultant clip, and including the information of other fat clip as the component clip when other fat clip is employed as the component clip; and a rerunning step (for example, step 58 of Fig. 8) for retrieving a second fat clip associated with a first fat clip when the first fat clip is corrected and rerunning a process corresponding to the work information of the second fat clip so that the resultant clip of the second fat clip is formed again.

[0026]

A method for processing an image according to Claim 4, further comprises: a reading step (for example, step S56 of Fig. 8) of reading a prescribed module forming a prescribed fat clip when the prescribed fat clip is selected in the prescribed module.

[0027]

A method for processing an image according to Claim 5, further comprises: an identifying step (for example, step S54 of Fig. 8) for applying an identification symbol (for example, identifier) for identifying from a third fat clip which is not related to the first fat clip to the second fat clip.

[0028]

An apparatus for processing an image according to Claim 6

comprises: a forming means (for example, step S 52 of Fig. 8) for forming a fat clip including work information when a resultant clip is formed by carrying out at least one process of the processes of editing, composition or special effect relative to a prescribed component clip every module, the resultant clip formed correspondingly to the work information and information related to the component clip used for forming the resultant clip, and including the information of other fat clip as the component clip when other fat clip is employed as the component clip; and a rerunning means (for example, step S58 of Fig. 8) for retrieving a second fat clip associated with a first fat clip when the first fat clip is corrected and rerunning a process corresponding to the work information of the second fat clip so that the resultant clip of the second fat clip is formed again.

[0029]

Fig. 1 illustrates a structural example of a system to which the method for processing an image according to the present invention is applied. A keyboard 2, a mouse 3 and a pad 4 or the like are connected to a work station 1,so that required commands can be properly input. Prescribed characters, images or the like are suitably displayed on a display 5 from the work station 1. A jog fader controller 6 is designed to output a control signal gradually changing corresponding to the operation of a user to a device controller and frame buffer 7.

[0030]

A switcher 8 is designed to properly select inputs from a video disk recorder 12, a video tape recorder (VTR) 13, or a video camera 14, output and store them to the device controller and frame buffer 7. Further, the switcher 8 is designed to supply prescribed image data to digital multi effectors 9 and 10 so that they carry out an effect processing. The switcher 8 is designed to output data read from the device controller and frame buffer 7 to a monitor 15 and display it thereon. An audio mixer 11 is designed to perform a mixing to audio data supplied from the video disk recorder 12 and output it to the video disk recorder 12 or the VTR 13.

[0031]

Fig. 2 illustrates the basic structure of a program for editing which is stored in the work station 1. A module for carrying out various kinds of editing processings is divided into an editing module EM, a composition module CM and a special effect module SM, respectively. The editing module, the composition module CM and the special effect module SM are started by a module control part and respective GUIs are output and displayed onto the monitor 15. A user carries out interactively editing, composition and special effect operations meeting the GUIs.

[0032]

Further, these modules are designed to write the

operations interactively input by the user to the fat clip (FatClip) of an edit tree storing part TM. The respective modules properly control the video disk recorder 12, the VTR 13, the video camera 14 or the like based on work information written in the fat clip, and carry out a software process to an output therefrom so that a resultant clip, is formed, which is obtained as a result of the execution of editing, composition and special effect.

[0033]

The module control part MC reads the hierarchical structure of the fat clip of the edit tree storing part TM, starts the module forming the fat clip selected by the user and changes the fat clip. When a rerunning corresponding to the work information stored in the fat clip is carried out, the respective modules are started in an order described in an edit tree list corresponding to the edit tree.

[0034]

The edit tree storing part TM stores the work information over all the ranks or layers of hierarchical editing, composition and special effect operations in the fat clips every module. The fat clips are dynamically formed depending on the operation and connected to the hierarchical structure. Accordingly, all the hierarchical editing, composition and special effect operations can be stored. Further, the order for processing the modules can be also arbitrarily determined.

[0035]

The fat clip has such data as mentioned below.

(1) An identifier indicating the module of editing, composition or special effect which generates the fat clip.

(2) The identifier of a component clip which is an element material of the fat clip.

(3) Work information formed by a user in the modules of editing, composition and special effect (editing data, parameter of composition and parameter of special effect).

(4) The identifier of the resultant clip of editing, composition and special effect operations by the fat clip.

[0036]

The identifier of the resultant clip is deemed to be a significant identifier only when the resultant clip of the work is actually formed. However, when the resultant clip has not been formed, or when the resultant clip is formed and then, a changing work is further added to the clip so that the resultant clip becomes insignificant, the above mentioned identifier is corrected to an insignificant identifier. That is, whether the resultant clip is significant or not can be decided from its identifier.

[0037]

Fig. 3 illustrates the contents of the fat clips X, Y and Z shown in the edit tree storing part TM in Fig. 2. In the case of this example, the fat clip X is formed correspondingly to

forming of the fat clip CX when component clips MC21 to MC23 are subjected to a composition process, so that it stores the identifier IDCM of the composition module as an identifier for indicating a module for forming the fat clip. Further, IDMC21 to IDMC23 which are the IDs of the components clips MC21 to MC23 are stored as the identifiers of clips which constitute the elements of the fat clip and the parameters of composition are also stored as work information formed by the user. Additionally, IDCX is stored as the identifier of the resultant clip CX.

[0038]

The fat clip Y is formed when a resultant clip CY is formed by processing component clips MC31 to MC34 in accordance with the special effect module, so that the fat clip Y stores the identifier IDSM of the special effect module as an identifier for indicating the module forming the present fat clip. Further, IDMC31 to IDMC34 which are the IDs of the component clips MC31 to MC34 are stored as the identifiers of clips which constitute the elements of this fat clip. The parameters of special effect are stored as the work information formed by the user. IDCY which is the ID of the resultant clip CY is stored as the identifier of the resultant clip.

[0039]

The fat clip Z is formed corresponding to an editing work when a resultant clip CZ is formed by editing the resultant

clip CX of the fat clip X and the resultant clip CY of the fat clip Y. In the fat clip Z, the identifier IDEM of the editing module is stored as an identifier for indicating the module forming the present fat clip and the identifiers IDFCX and IDFCY which are the identifiers of the fat clip X and the fat clip Y as the identifiers of the clips which constitute the elements of the present fat clip. Further, editing data for wiping the resultant clip CX and the resultant clip CY in accordance with the editing module EM is stored as the work information. In addition, IDCZ which is the identifier of the resultant clip CZ is stored as the identifier of the resultant clip as a result of operation by this fat clip.

[0040]

In Fig. 3, although the fat clips X to Z are respectively made to correspond to the composition module CM, the special effect module SM or the editing module EM, for simplification, these fat clips may be formed so as to meet two or more composite processes of the three modules.

[0041]

Next, the operation of an embodiment shown in Fig. 1 will be described with reference to a flowchart shown in Fig. 4. Processes of Fig. 4 are carried out by a CPU (not shown) built in the work station 1. When an editing system is started, a top menu is initially displayed on the monitor 15 in step S1. The top menu comprises items of the five editors of Editor (editing

module), Composite (composition module), Effect (special effect module), Library (library module) and System (system module). When the top menu is displayed on the monitor 15, the selection of a prescribed menu by a user is stood by. When one of the five menus is selected, which one of Editor, Composite, Effect, Library and System the selection is directed to is respectively decided in steps S3, S5, S7, S9 and S11. When one of them is decided, the above described steps respectively advance to steps S4, S6, S8, S10 or S12. An editing module mode, a composition module mode, a special effect module mode, a library module mode or a system module mode which corresponds to the selection is set.

[0042]

For example, when the editing module mode of the step S4 is set, processes shown in a flowchart of Fig. 5 is carried out. Specifically stated, the GUI of the editing module mode is first displayed on the monitor 15 in step S21. The user sees the display of this GUI and inputs whether a new editing is carried out (a fat clip is newly formed) or an already performed editing is corrected (an already formed fat clip is corrected). When the input to carry out a new editing is supplied, the process proceeds to step S23 and a process for newly forming a fat clip is performed. On the other hand, when the input to correct the already carried out editing is supplied, the process advances to step S24 and a fat clip

corresponding to the designated (corrected) editing is read. Then, an editing process is executed in step S25.

[0043]

Further, when the composition module mode in the step S6 of Fig. 4 is set, processes shown in a flowchart of Fig. 6 are performed. The GUI of the composition module mode is displayed on the monitor 15 in step S31. The user sees the display of the GUI of the monitor 15 and inputs whether a new composition process is carried out or the correcting process of an already performed composition process is carried out. When it is decided that an input to carry out the new composition process is supplied in step S32, the process proceeds to step S33 so that a new fat clip is formed. When it is decided that an input to correct the already performed composition process is supplied in the step S32, the process advances to step S34 so that a process for reading a fat clip corresponding to the designated (corrected) composition process is performed. Then, a composition process is executed in step S35.

[0044]

Similarly, when the special effect module mode in the step S8 of Fig. 4 is set, processes shown in a flowchart of Fig. 7 are carried out. Initially, the GUI of the special effect module mode is displayed on the monitor in step S41. The user sees the display of the GUI and inputs whether a new special effect process is carried out or an already performed special

effect process is corrected. When it is decided that an input to carry out the new special effect process is supplied in step S42, the process advances to step S43 so that a new fat clip is formed. On the other hand, when it is decided that an input to correct an already formed special effect process is supplied in the step S42, the process proceeds to step S44 so that a process for reading a fat clip corresponding to the designated (corrected) special effect process is executed. Then, the process advances to step S45 so that a special effect process is performed.

[0045]

The details of the editing process in the step S25 of Fig. 5 are illustrated in a flowchart of Fig. 8.

[0046]

The illustrations of the processes of the steps S35 and S45 in Figs. 6 and 7 are omitted. The composition process or the special effect process not only corresponds to the editing process in Fig.8, but also is similar to the editing process shown Fig. 8.

[0047]

In Fig. 8, whether an input corresponding to the editing process is supplied by the user or not is first decided in step S51. When it is decided that the input corresponding to such a process is supplied, the process proceeds to step S52, so that editing data corresponding to the input is suitably written in

the newly formed fat clip or the already formed and read fat clip. Further, at this time, a prescribed image corresponding to the input is displayed on the monitor 15, an edit tree corresponding to the input (corresponding to work information) is properly formed and the input is stored in an edit tree storing part TM. That is, when the user thus performs a prescribed editing input by appropriately operating the keyboard 2, the mouse 3, the pad 4, the jog fader controller 6 or the like, the fat clip and the edit tree corresponding thereto are automatically formed or corrected. Further, the identifier of the corrected fat clip is changed to an invalid identifier.

[0048]

Next, the process proceeds to step S53 and whether the fat clip of a rank or layer higher than a currently corrected fat clip is present or not is decided. When it is decided that the fat clip of the upper layer is present, the process advances to step S54 so that a fat clip using the resultant clip of the fat clip corrected in the step S52 as a component clip or a fat clip using the thus obtained fat clip as a component clip or the like (associated clip) has its identifier changed to an invalid identifier. Thus, for example, while the prescribed resultant clip of a prescribed hierarchical structure (the uppermost resultant clip of the edit tree at that time) is formed, when a work for correcting a fat clip of

a layer lower than the uppermost resultant clip is carried out, the identifier of the resultant clip (associated resultant clip) of a fat clip (associated fat clip) of a layer higher than that of the fat clip to be corrected is changed to an invalid identifier.

[0049]

When it is decided that the fat clip of the upper layer is not present, the process of the step S54 is skipped.

[0050]

For example, it is assumed that an edit tree is formed, as illustrated in Fig. 9. In this edit tree, a fat clip MC-G is formed with component clips MCG1 and MCG2 and a fat clip FC-E uses component clips MCE1 and MCE2 and a fat clip FC-G as component clips. The component clip of a fat clip FC-C includes a component clip MCC1 and the fat clip FC-E.

[0051]

The fat clip FC-F uses components clips MCF1 to MCF3 as component clips and a fat clip FC-D uses component clips MCD1 and MCD2 as well as fat clips FC-E and FC-F as component clips. A fat clip FC-B uses the fat clips FC-C and FC-D as well as a component clip MCB1 as component clips. A fat clip FC-A uses the fat clip FC-B and the component clip MCB1 as component clips.

[0052]

When a correction is not specially applied to the fat

clip, the identifiers of the respectively formed fat clips are all deemed to be valid identifiers. However, for example, when the fat clip FC-E is changed, the identifiers of the fat clip FC-E, the fat clips FC-C and FC-D using the fat clip FC-E as a component clip, the fat clip FC-B using the fat clips FC-C and FC-D as component clips and further the fat clip FC-A using the fat clip FC-B as a component clip are respectively changed to invalid identifiers, since they serve as the identifier of an associated fat clip (of an upper layer).

[0053]

When it is decided that the editing process is not input in the step S51 of Fig. 8, the process proceeds to step S55 to decide whether a displayed clip is selected or not. When it is decided that the displayed clip is selected in the step S55, the process advances to step S56 so that a process for starting the module of a corresponding mode is carried out.

[0054]

The details of the process for starting the module of the corresponding mode of the step S56 are shown in a flowchart of Fig. 10. In the process for starting the module of the corresponding mode, as shown in Fig. 10, the identifier of the fat clip of the selected clip is initially reported to a module control part MC in step S71. Then, the module control part MC reads out a module identifier of the reported identifier in the fat clip in step S72. Further, the module control part MC

carries out a process for starting a module corresponding to the read module identifier.

[0055]

For example, as illustrated in Fig. 11, while an image corresponding to the fat clip Z shown in Fig. 3 is displayed on the monitor 15 (state of the mode of the editing module EM), when the resultant clip CX of the resultant clip CZ comprising the resultant clip CX and the resultant clip CY is changed, the user operates the mouse 3, moves a cursor onto the resultant clip CX and double clicks the mouse 3 so that he commands the selection of the displayed clip. At this time, the module (composition module CM) of the fat clip X corresponding to the selected resultant clip CX is read out and the corresponding image is displayed on the monitor 15 as illustrated in Fig. 12. Accordingly, the user can immediately start an input for properly correcting the fat clip X from the state illustrated in Fig. 12 (the state of the mode of the composition module CM corresponding to the fat clip X). Processings for this input are carried out in accordance with the above mentioned steps S51, S52, S53 and S54 in Fig. 8.

[0056]

When the button Editor of a top menu displayed on the lower left part of a display example in Fig. 11 is operated, the editing module is called. When a button Composite below it is operated, the composition module is called. Further, when a

button Effect below it is operated, the special effect module is called. A button Library controls the VTR 13 or the video disk recorder 12 connected to the work station 1. A button Library is operated when ordinary clips (clips which are not fat clips) are formed, or when the formed clips are listed up (when a browse menu is read out). A button System is operated when a system is entirely set. When the button Library is operated, the library module is operated. When the button System is operated, the system module is operated.

[0057]

Buttons List, Picture, Free Form in the browse menu in the right side of the top menu shown in Fig. 11 are buttons operated when a display format for displaying the list of available clips is selected. For example, when the list of the names of the clips or the like are displayed in characters, the button List is operated. When the initial one frame of the clip is reduced, arranged and displayed in the form of tiles, the button Picture is operated. The button Free Form is operated when the clip is displayed in a free form. A button View is operated when a clip located in a browser is directly displayed in the form of an animated image.

[0058]

A button Preview in the right side of the display example in Fig. 11 is operated when a selected clip is displayed in the form an animated image. When the button Preview is operated,

the rerunning process of the fat clip is not carried out (the rerunning process will be described later). Although the animated image displayed when this button is operated is sometimes different from an animated image as a final result, it is employed when it is desired to check the length of the clip during the editing process, since the display of the image is started as soon as the button is operated.

[0059]

A button View is operated when the selected clip is displayed in the form of an animated image. When this button is operated, a rerunning process is carried out, which is different from the case in which the button Preview is operated. It takes time until the display is carried out after this button is operated. However, when this button is operated, an image as a final result can be displayed.

[0060]

A button All Preview is operated when first to last clips are displayed in the forms of animated images without selecting a clip. When it is desired to rerun and display the results of all editing processes, a button All view is operated.

[0061]

A button Browser is operated when a browse menu (a menu displayed in the right side of the top menu in Fig. 11) for listing up clips which are usable for editing is displayed. Since another menu may be displayed in the position of the

browse menu in the right side of the top menu, the button Browser is provided so that the browse menu can be displayed in this position at an arbitrary timing.

[0062]

A display 00:00:00:00 below the button Browser represents time when a current cursor exists in the number of hours, minutes seconds and frames. A static image at the time (a position on an axis of abscissa) when the current cursor is present is displayed on the monitor 15.

[0063]

Border, x, y, T and B displayed in the right side of a top menu shown in Fig. 12 represent composition methods or the values of parameters. The parameters can be changed for each frame in the position of a graphic display in the right side of the parameters.

[0064]

When it is decided that a command for selecting the displayed clip is not input in the step S55 of Fig. 8, the process proceeds to step S57 to decide whether a rerunning command is input or not. This rerunning command is decided to be input, for example, when the fat clip FC-E on the edit tree in Fig. 9 is changed, and then, a command for registering (saving) the change in a hard disk internally contained in the work station 1 is input. Additionally, when the above mentioned button View or All View is operated, it is also decided that

the rerunning command is input. When it is decided that the rerunning command is input, the process advances to step S58 so that a rerunning process is carried out. The details of the rerunning process are illustrated in a flowchart of Fig.13.

[0065]

In the rerunning process, the identifier (simply, also referred to as a fatclip, hereinafter) of the uppermost fat clip of the edit tree is first pushed to a stack in step S81. For example, in the example shown in Fig. 9, the fat clip FC-A is written on the stack. Then, the process proceeds to step S82 to decide whether the stack is empty or not. In this case, since the uppermost fat clip of the edit tree is written on the stack in the step S81, the stack is not empty. Accordingly, the decision of NO is performed and the process proceeds to step S83. In the step S83, one fat clip is popped from the stack to decide whether the resultant fat clip of the above described fat clip is valid or not. In the case of the example shown in Fig. 9, since the resultant clip of the fat clip FC-A is deemed to be invalid, the decision of NO is carried out and the process advances to step S84.

[0066]

In the step S84, whether the component clips of the fat clip taken out in the step S83 are all ordinary clips (clips which are not fat clips) or fat clips having valid resultant clips. In the case of the example of Fig. 9, The component clip

of the fat clip FC-A is the fat clip FC-B whose resultant clip is deemed to be invalid. Thus, in this case, the decision of NO is performed, so the process proceeds to step S86.

[0067]

In the step S86, the fat clip FC-A which is the present fat clip is pushed to the stack. Further, in step S87, the fat clip which is decided to be a fat clip having the insignificant resultant clip in the step S84 is written on the stack.

[0068]

Then, the process returns to the step S82 to decide whether the stack is empty or not. Since the stack is not empty at present, the process advances to the step S83 so that the fat clip FC-B (the latest fat clip) is taken out from the stack to decide whether its resultant clip is valid or not. Since the resultant clip of the fat clip FC-B is invalid, the process advances to the process to the step S84 to decide whether the fat clip FC-C which is the component clip of the fat clip FC-B is a fat clip having a valid resultant clip or not. Since the fat clip FC-C has the invalid resultant clip, the process advances to the step S86. Then, the current fat clip FC-B is pushed to the stack. In the step S87, the fat clip FC-C having the invalid resultant clip is pushed to the stack.

[0069]

The process advances to the step S83 from the step S82 again. For example,the fat clip FC-C is taken out from the

stack so that whether the fat clip has a significant resultant clip or not is decided. Since the fat clip FC-C has the invalid resultant clip, the decision of NO is performed and the process proceeds to the step S84. In the step S84, whether the component clip FC-E of the fat clip FC-C is a fat clip having a valid resultant clip or not is decided. Since the fat clip FC-E has the invalid resultant clip, the decision of NO is carried out. In the steps S86 and 87, the fat clips FC-C and FC-E are pushed to the stack.

[0070]

The process advances again to the step S83 from the step S82. One fat clip FC-E is taken out from the stack to decide whether the resultant clip of the fatclip is valid or not. Since the fat clip FC-E has the in significant resultant clip, the process advances to the step S84 to decide whether the component clips of the fat clip FC-E form a fat clip having completely ordinary clips or significant or valid resultant clips or not. The component clips of the fat clip FC-E comprises the components clips MCE1 and MCE2 and the fat clip FC-G having the valid resultant clip. Therefore, in this case, the decide on of YES is performed and the process advances to step S85.

[0071]

In the step S85, the editing process is carried out to the component clips MCE1 and MCE2 and the fat clip FC-G

corresponding to the work information of the fat clip FC-E, so that a resultant clip is formed again.

[0072]

Then, the process returns to the step S83 from the step S82. The fat clip FC-C is taken out from the stack to decide whether its resultant clip is valid or not. Since the resultant clip of the fat clip FC-C is insignificant, the process proceeds to the step S84 to decide whether all the component clips of the fat clip FC-C constitute a fat clip having ordinary clips or significant resultant clips or not. Since the component clips of the fat clip FC-C comprise the component clip MCC1 and the fat clip FC-E having the significant resultant clip, the decision of YES is carried out. In the step S85, the editing process is performed to the component clip MCC1 and the fat clip FC-E (its resultant clip) correspondingly to the work information of the FC-C. Thus, a resultant clip is formed again.

[0073]

The step S82 advances again to the step S83. The fat clip FC-B is taken out from the stack. Since the resultant clip thereof is invalid, the step S83 proceeds to the step S 84 to decide whether all the component clips of the fat clip FC-B constitute a fat clip having ordinary component clips and significant resultant clips or not. Since the fat clip FC-B has the invalid fat clip FC-D as the component clip, the decision

of NO is carried out. In the steps S86 and S87, the fat clips FB-B and FC-D are pushed to the stack.

[0074]

The step S82 advances to the step S83. The fat clip FC-D is taken out from the stack. Since the fat clip FC-D has the invalid resultant clip, the step S83 advances to the step S84 to decide whether its component clips are all valid or not. The component clips of the fat clip FC-D comprise the component clips MCD1 and MCD2 and the fat clips FC-E and FC-F. Both the fat clips FC-E and FC-F have valid resultant clips, so that the decision of YES is carried out in the step S84 and the step S84 proceeds to the step S85. Then, in the step S85, the editing process is carried out to the component clips MCD1 and MCD2 and the fat clips FC-E and FC-F, so that a resultant clip is formed again.

[0075]

The process advances again to the step S83 through the step S82. The fat clip FC-B is taken out from the stack to decide whether the resultant clip thereof is valid or not. Since the resultant clip of the fat clip FC-B is invalid, the process advances to the step S84 to decide whether the component clips of the fat clip are all valid or not. Since the component clip MCB1 and the fat clips FC-C and FC-D of the fat clip FC-B are all valid, the decision of YES is performed in the step S84. In the step S85, the editing process is carried

out to the component clip MCB1 and the fat clips FC-C and FC-D, so that a resultant clip is formed again.

[0076]

Further, the process proceeds from the step S82 to the step S83. The fat clip FC-A is taken out. Since its resultant clip is invalid, the process advances to the step S84 to decide whether all the component clips of the fat clip FC-A are valid or not. Since the fat clip FC-B which is the component clip of the fat clip FC-A has a valid resultant clip, the process advances to the step S85. Therefore, the editing process is carried out to the fat clip FC-B as the component clip corresponding to the work information of the fat clip FC-A. Thus, a resultant clip is formed again.

[0077]

Then, the process returns to the step S82 to decide whether the stack is empty or not. Since all the rerunning processes have been completed, YES is decided herein to finish the rerunning process.

[0078]

In addition, when the resultant clip of the fat clip taken out from the stack is decided to be valid in the step S83, the process returns to the step S82. For example, when the uppermost fat clip of the edit tree is valid, the fat clip pushed to the stack in the step S81 is decided to have a valid resultant clip in the step S83 and the process returns to the

step S82. Then, it is decided that the stack is empty in the step S82 and the process is immediately completed. In such a way, when the uppermost fat clip of the edit tree has the valid resultant clip, the rerunning process is not substantially performed.

[0079]

Fig. 14 illustrates the processes of the flowchart in Fig. 13 which are got together. As illustrated in Fig. 14, when the resultant clip of the uppermost fat clip FC-A of the edit tree is invalid, the module of the fat clip FC-A requests the module of the fat clip FC-B to transfer the resultant clip. The module of the fat clip FC-B further request the module of the fat clip FC-C to transfer the resultant clip. Then, the module of the fat clip FC-C further requests the module of the fat clip FC-E, which further requests the module of the fat clip FC-G, to transfer the resultant clip. Since the resultant clip of the fat clip FC-G is decided to be valid, this resultant clip is transferred to the module of the fat clip FC-E. The module of the fat clip FC-E forms again a resultant clip based on the resultant clip and other component clip and transfers the new resultant clip to the module of the fat clip FC-C. The module of the fat clip FC-C forms a resultant clip from the above described resultant clip and other component clip and transfers it to the module of the fat clip FC-B.

[0080]

The module of the fat clip FC-B requests the module of the fat clip FC-D as other component clip to transfer the resultant clip. The module of the fat clip FC-D further requests the module of the fat clip FC-E to transfer the resultant clip. Since the resultant clip of the fat clip FC-E is formed again and decided to be significant, it is immediately transferred to the module of the fat clip FC-D.

[0081]

The module of the fat clip FC-D further requests the module of other fat clip FC-F to transfer the resultant clip. Since the resultant clip of the fat clip FC-F is valid, it is rapidly transferred to the module of the fat clip FC-D.

[0082]

The module of the fat clip FC-D forms a resultant clip again based on the resultant clips transferred from the module of the fat clip FC-E and the module of the fat clip FC-F and other component clip and transfers the new resultant clip to the module of the fat clip FC-B of the upper layer. The module of the fat clip FC-B forms again a resultant clip based on the resultant clip of the fat clip FC-D and other component clips and transfers it to the module of the fat clip FC-A. The module of the fat clip FC-A forms a resultant clip again based on the resultant clip of the fat clip FC-B.

[0083]

When the fat clip FC-E is corrected as mentioned above,

its resultant clip and the identifiers of the resultant clips of the fat clips located in the layers higher than that of the fat clip FC-E are immediately deemed to be invalid. However, when the saving of the fat clip FC-E or the like is commanded, thereafter, the rerunning process is automatically executed.

[0084]

Although the rerunning process may be rapidly started when the correcting process is carried out, it is desired only to change (retrieve associated fat clips) the identifiers during the correction, since it takes some time to perform the rerunning process.

[0085]

[Effect of the Invention]

As stated above, according to the method for processing an image described in Claim 1 and the apparatus for processing an image described in Claim 6, since the information of other fat clips as the component clips is held, the hierarchical fat clips can be managed between the different modules. Further, when the fat clip is corrected in the lower layer, the corresponding fat clips of the upper layers can be automatically newly formed. Accordingly, the editing process can be rapidly and simply carried out.

[Brief Description of the Drawings]

[Fig. 1]

Fig. 1 shows a structural example of a system to which a method for processing an image according to the present invention is applied.

[Fig. 2]

Fig. 2 is an explanatory view for explaining the structure of a program for processing an image in a work station.

[Fig. 3]

Fig. 3 is an explanatory view for explaining the structure of the fat clips of an edit tree storing part in Fig. 2.

[Fig. 4]

Fig. 4 is a flowchart for explaining the operation of a first embodiment.

[Fig. 5]

Fig. 5 is a flowchart for explaining the details of the process of step S4 in Fig. 4.

[Fig. 6]

Fig. 6 is a flowchart for explaining the details of the process of step S6 in Fig. 4.

[Fig. 7]

Fig. 7 is a flowchart for explaining the details of the process of step S8 in Fig. 4.

[Fig. 8]

Fig. 8 is a flowchart for explaining the details of the

process of step S25 in Fig. 5.

[Fig. 9]

Fig. 9 is an explanatory view for explaining the processes of steps S53 and S54 in Fig. 8.

[Fig. 10]

Fig. 10 is a flowchart for explaining the details of the process of step S 56 in Fig. 8.

[Fig. 11]

Fig. 11 is an explanatory view for explaining the process of step S55 in Fig. 8.

[Fig. 12]

Fig. 12 is an explanatory view for explaining the process of step S56 in Fig. 8.

[Fig. 13]

Fig. 13 is a flowchart for explaining the details of the process of step S58 in Fig. 8.

[Fig. 14]

Fig. 14 is a timing chart for explaining the processes in Fig. 13.

[Fig. 15]

Fig. 15 is a flowchart for explaining a conventional method for processing an image.

[Fig. 16]

Fig. 16 is an explanatory view for explaining a conventional method for editing an image.

[Fig. 17]

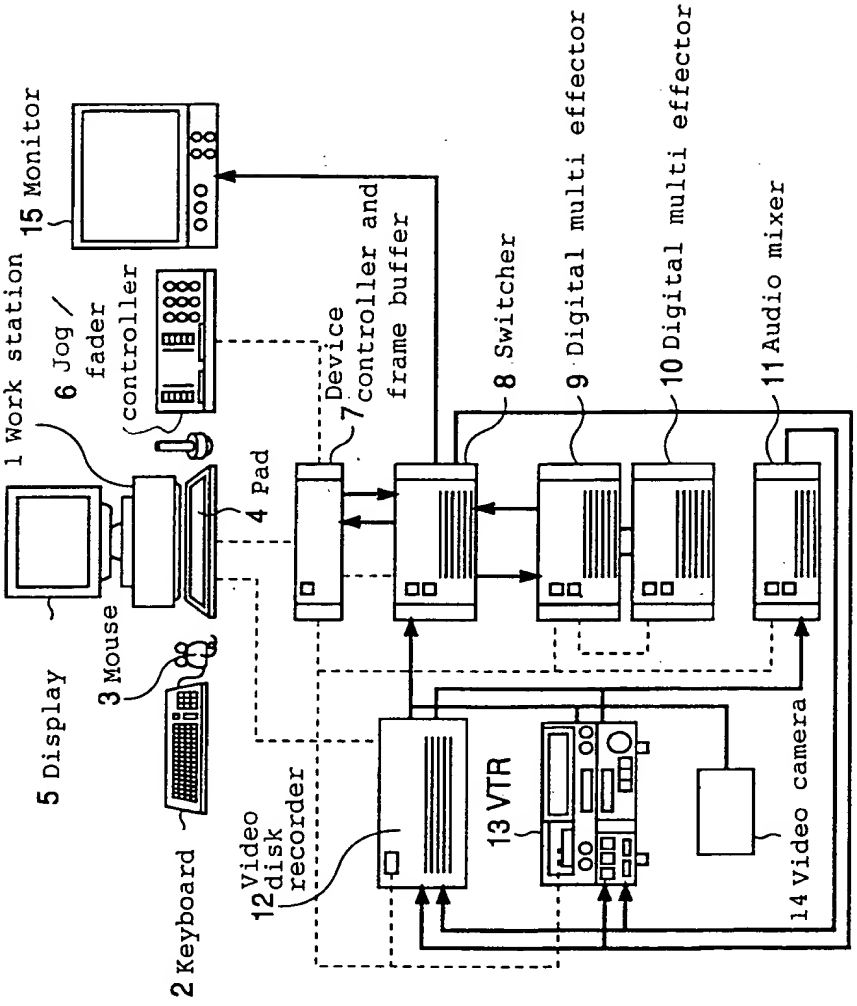
Fig. 17 shows the display example of the conventional method for editing an image.

[Explanation of Reference Numerals]

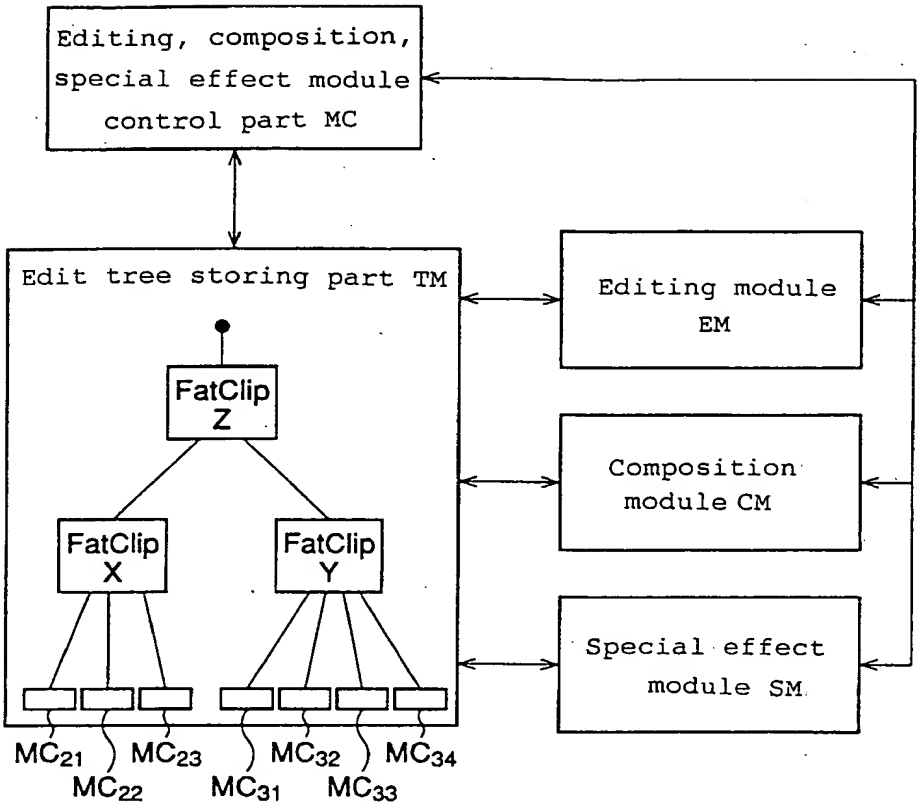
1...work station, 2...keyboard, 3...mouse, 4...pad, 5...display, 6...jog fader controller, 7...device controller and frame buffer, 8...switcher, 9, 10...digital multi effector, 11...audio mixer, 12...video disk recorder, 13...VTR, 14...video camera, 15...monitor.

[Name of Document] DRAWINGS

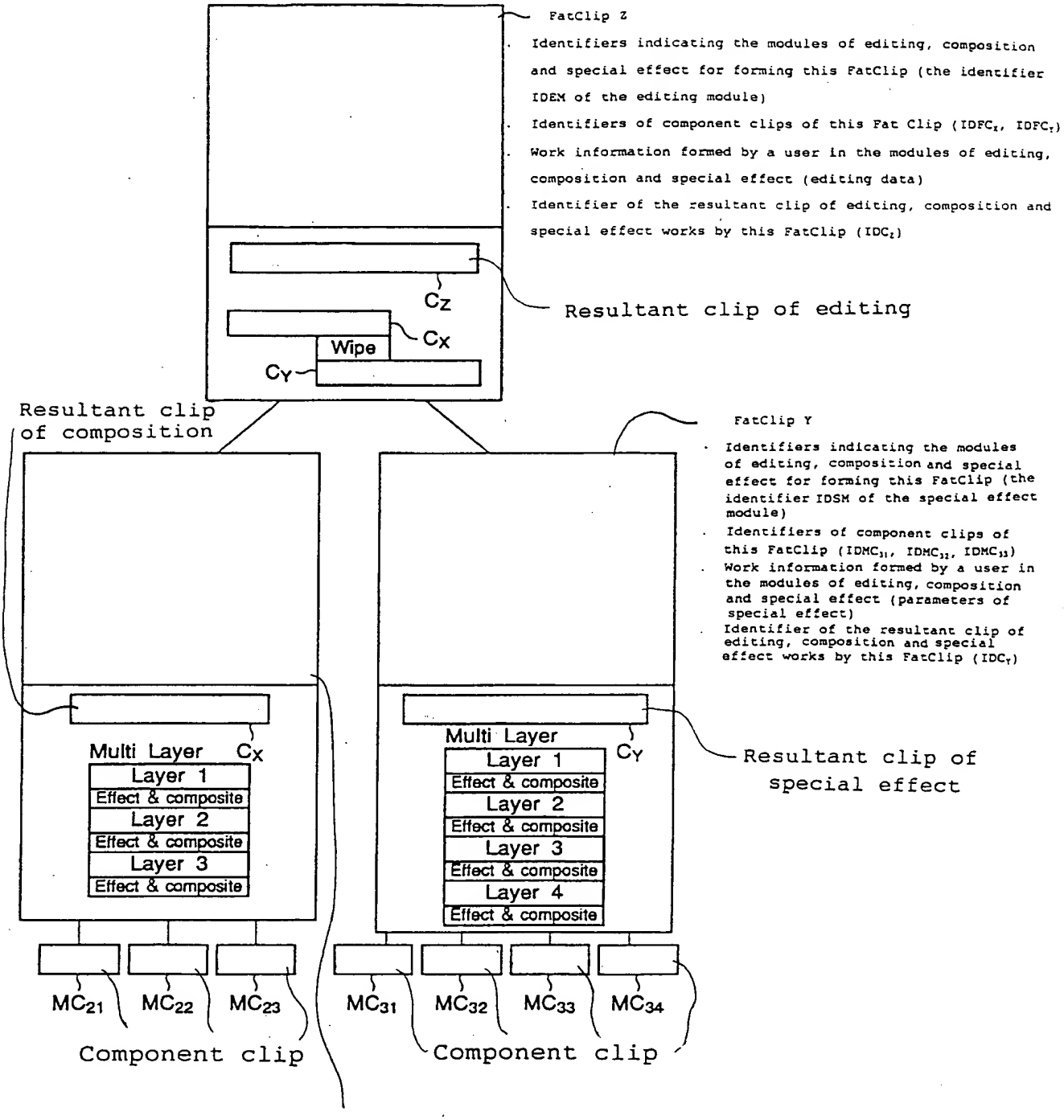
[FIG. 1]



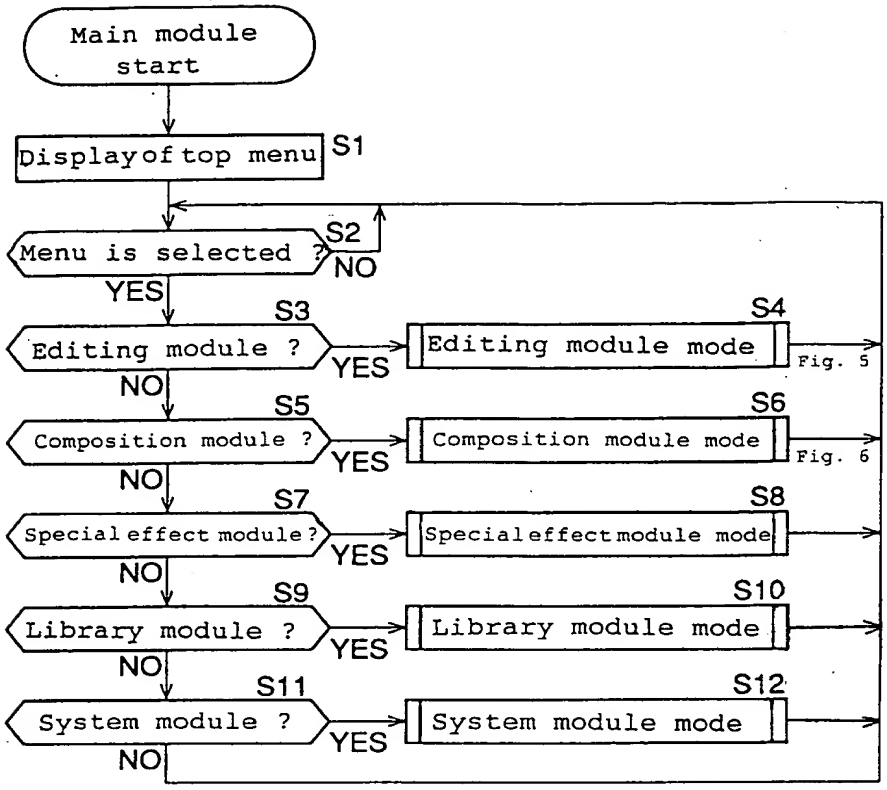
[FIG. 2]


Editing, composition, special effect module control part MC
Edit tree storing part TM
FatClip Z
FatClip X
FatClip Y
Editing module EM
Composition module CM
Special effect module SM
MC21
MC22
MC23
MC31
MC32
MC33
MC34

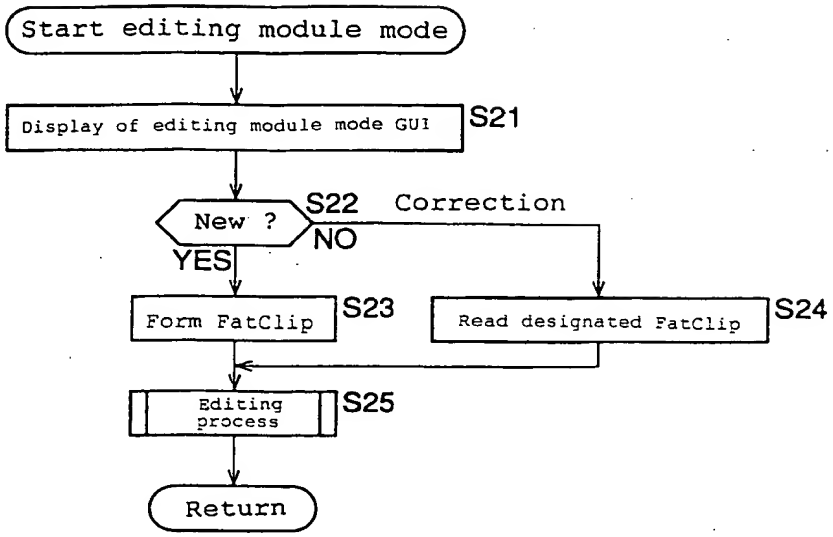
[FIG. 3]


FatClip Z
. Identifiers indicating the modules of editing, composition and special effect for forming this FatClip (the identifier IDEM of the editing module)
. Identifiers of component clips of this Fat Clip (IDFC1, IDFC2)
. Work information formed by a user in the modules of editing, composition and special effect (editing data)
. Identifier of the resultant clip of editing, composition and special effect works by this FatClip (IDCZ)
Cz
Resultant clip of editing
Cx
Wipe
CY
Resultant clip of composition
FatClip Y
. Identifiers indicating the modules of editing, composition and special effect for forming this FatClip (the identifier IDSM of the special effect module)
. Identifiers of component clips of this FatClip (IDMC31, IDMC32, IDMC33)
. Work information formed by a user in the modules of editing, composition and special effect (parameters of special effect)
. Identifier of the resultant clip of editing, composition and special effect works by this FatClip (IDCY)
Multi Layer
Cx
Layer 1
Effect & composite
Layer 2
Effect & composite
Layer 3
Effect & composite
Multi Layer
CY
Layer 1
Effect & composite
Layer 2
Effect & composite
Layer 3
Effect & composite
Layer 4
Effect & composite
Resultant clip of special effect
MC21
MC22
MC23
MC31
MC32
MC33
MC34
Component clip
Component clip
FatClip X
. Identifiers indicating the modules of editing, composition and special effect for forming this FatClip (the identifier IDCM of the composition module)
. Identifiers of component clips of this FatClip (IDMC11, IDMC12, IDMC13)
. Work information formed by a user in the modules of editing, composition and special effect (parameters of composition)
. Identifier of the resultant clip of editing, composition and special effect works by this FatClip (IDCX)

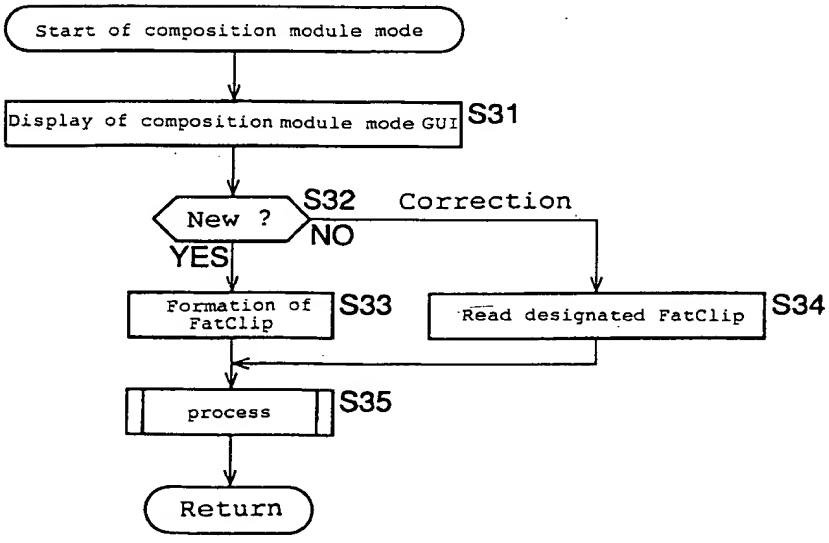
[FIG. 4]


Main module start
Display of top menu
S1
Menu is selected ?
S2
NO
YES
S3
Editing module ?
YES
S4
Editing module mode
Fig. 5
NO
S5
Composition module ?
YES
S6
Composition module mode
Fig. 6
NO
S7
Special effect module ?
YES
S8
Special effect module mode
NO
S9
Library module ?
YES
S10
Library module mode
NO
S11
System module ?
YES
S12
System module mode
NO

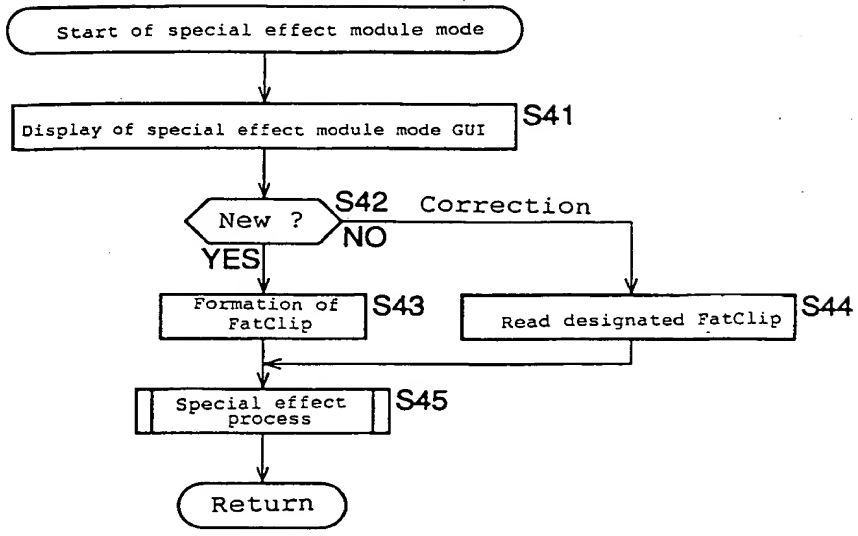
[FIG. 5]


Start editing module mode
Display of editing module mode GUI
S21
New ?
S22
Correction
NO
YES
Form FatClip
S23
Read designated FatClip
S24
Editing process
S25
Return

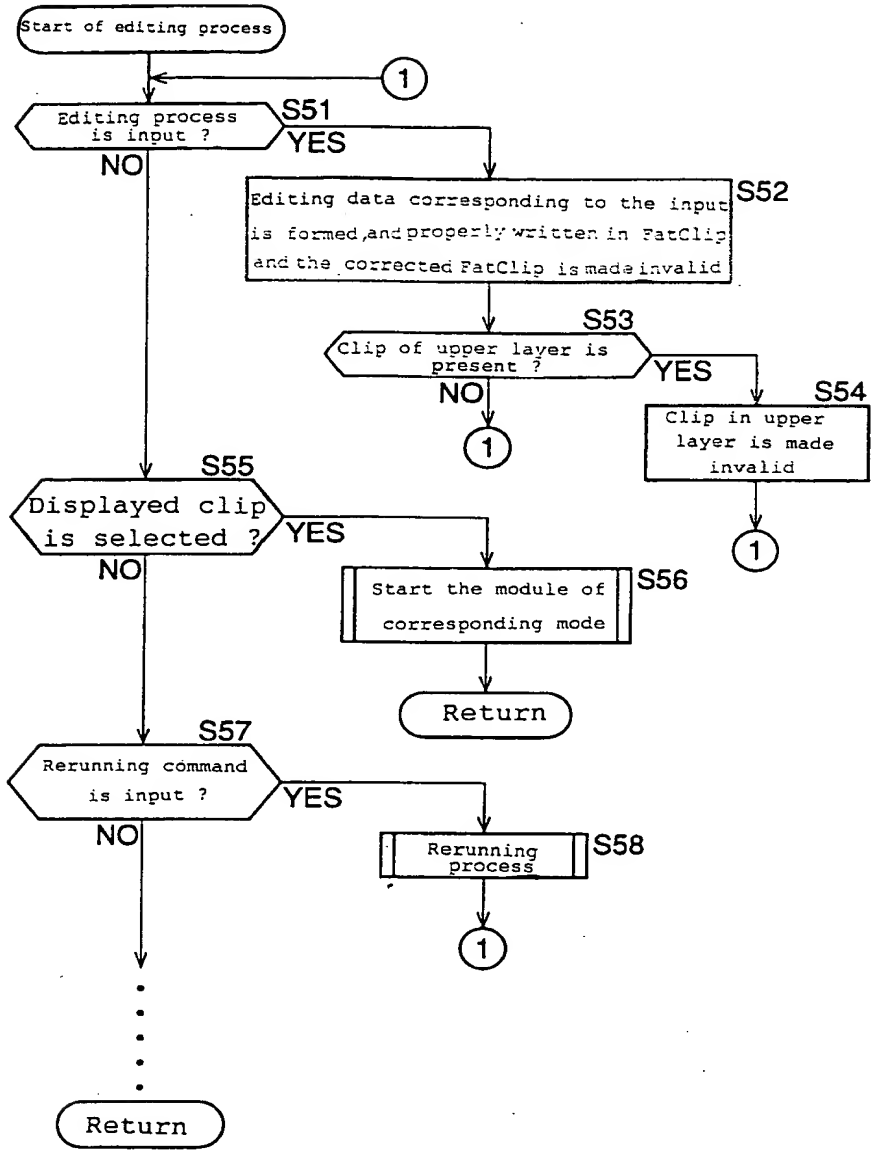
[FIG. 6]


Start of composition module mode
Display of composition module mode GUI
S31
New ?
S32
Correction
NO
YES
Formation of FatClip
S33
Read designated FatClip
S34
process
S35
Return

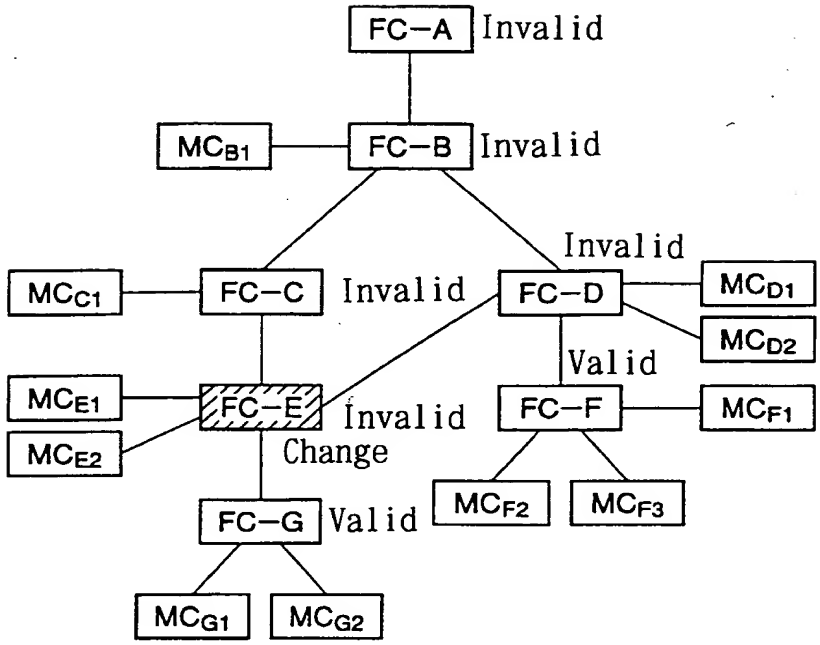
[FIG. 7]


Start of special effect module mode
Display of special effect module mode GUI
S41
New ?
S42
Correction
NO
YES
Formation of FatClip
S43
Read designated FatClip
S44
Special effect process
S45
Return

[FIG. 8]

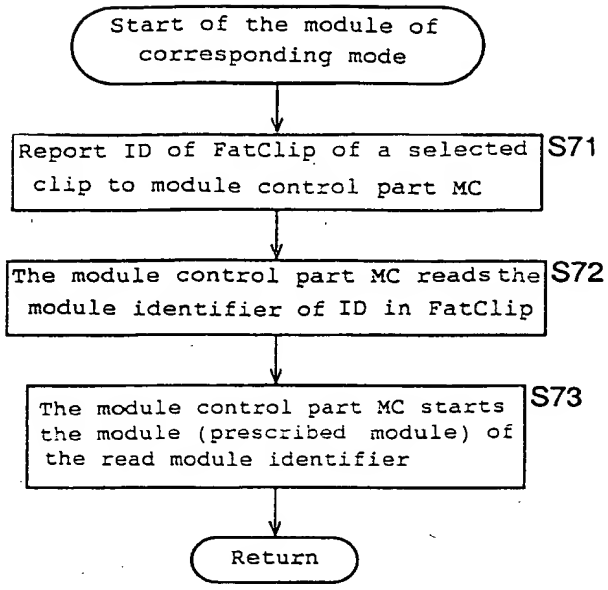

Start of editing process
1
Editing process is input ?
S51
YES
NO
Editing data corresponding to the input is formed, and properly written in FatClip and the corrected FatClip is made invalid
S52
Clip of upper layer is present ?
S53
YES
NO
1
Clip in upper layer is made invalid
S54
1
Displayed clip is selected ?
S55
YES
NO
Start the module of corresponding mode
S56
Return
Rerunning command is input ?
S57
YES
NO
Rerunning process
S58
1
Return

[FIG. 9]

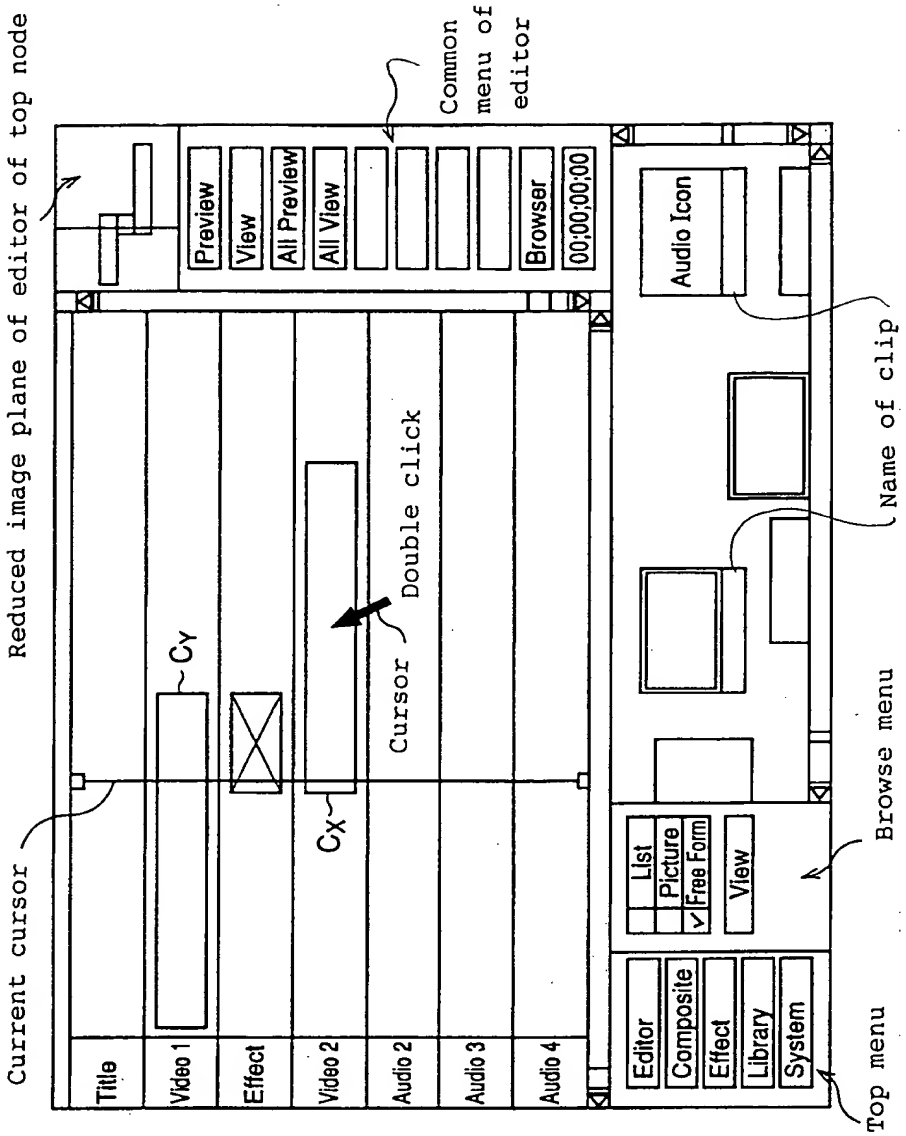


Edit tree

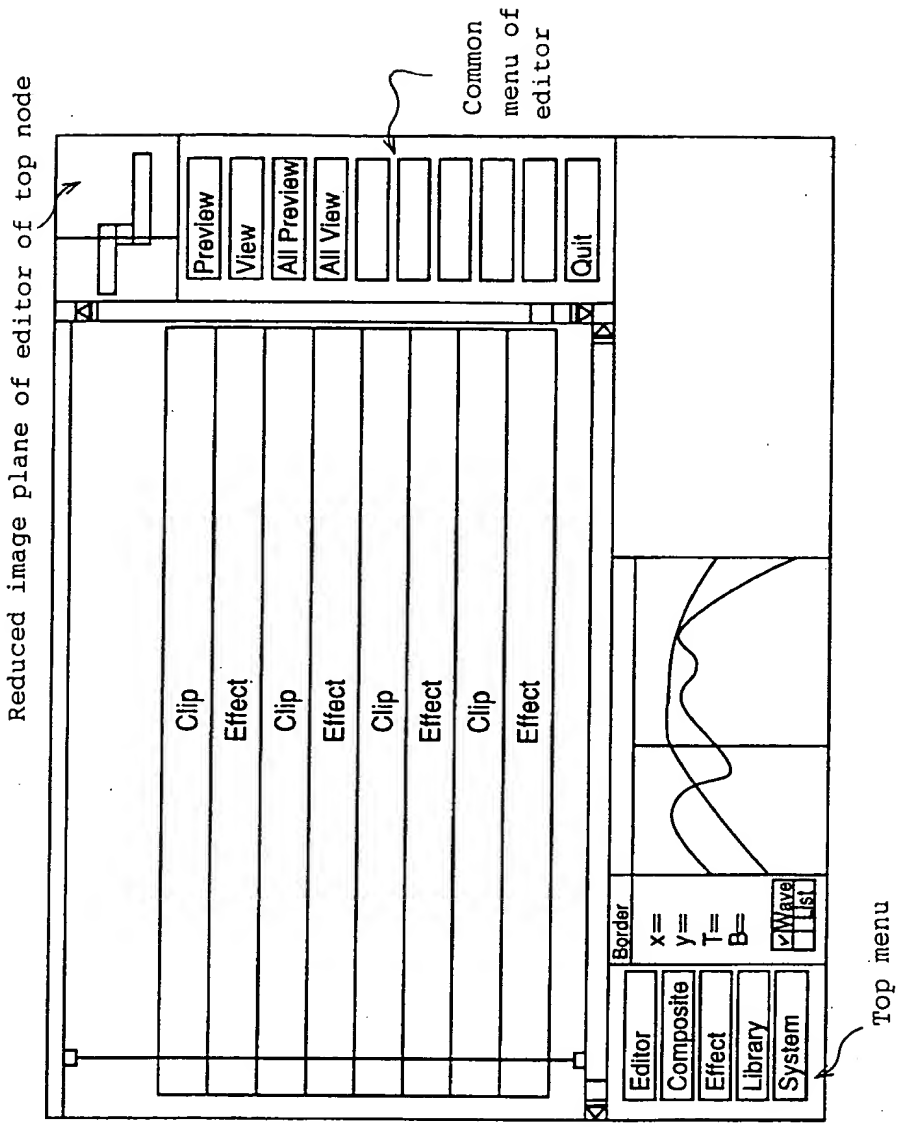
[FIG. 10]


Start of the module of corresponding mode
Report ID of FatClip of a selected clip to module control part MC
S71
The module control part MC reads the module identifier of ID in FatClip
S72
The module control part MC starts the module (prescribed module) of the read module identifier
S73
Return

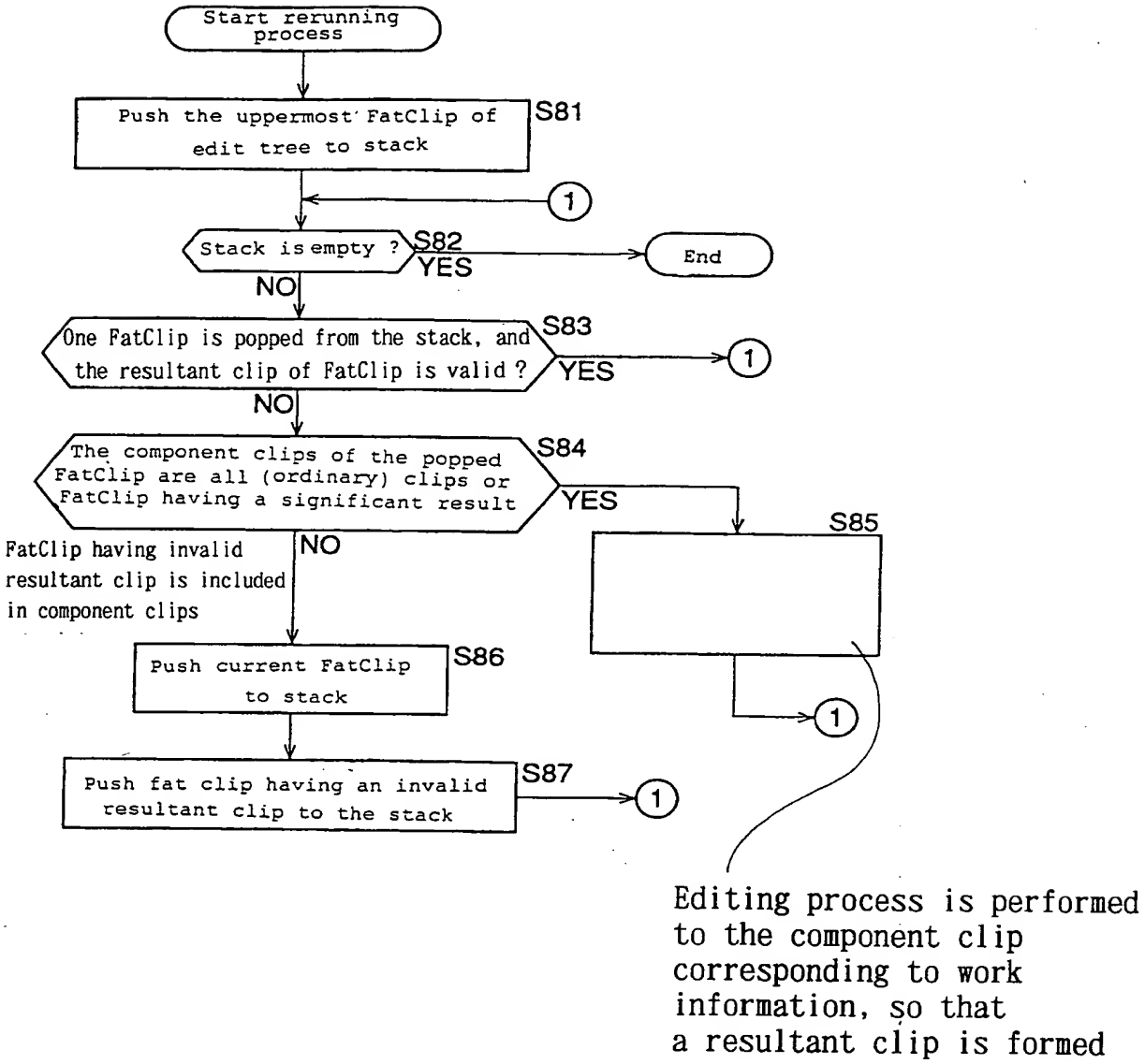
[FIG. 11]


Reduced image plane of editor of top node
Common menu of editor
Preview
View
All Preview
All View
Browser
00;00;00;00
Audio Icon
Name of clip
Cy
Cursor
Double click
Cx
Current cursor
Title
Video 1
Effect
Video 2
Audio 2
Audio 3
Audio 4
List
Picture
Free Form
View
Browse menu
Editor
Composite
Effect
Library
System
Top menu

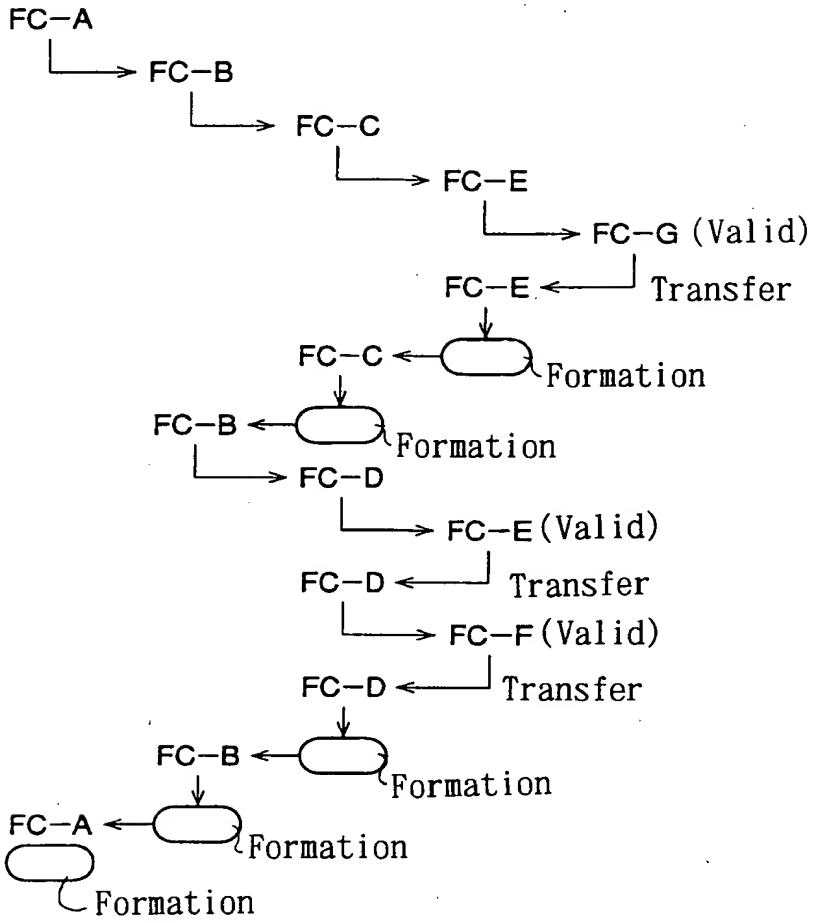
[FIG. 12]


Reduced image plane of editor of top node
Common menu of editor
Preview
View
All Preview
All View
Quit
Clip
Effect
Clip
Effect
Clip
Effect
Clip
Effect
Border
x=
y=
T=
B=
Wave list
Editor
Composite
Effect
Library
System
Top menu

[FIG. 13]

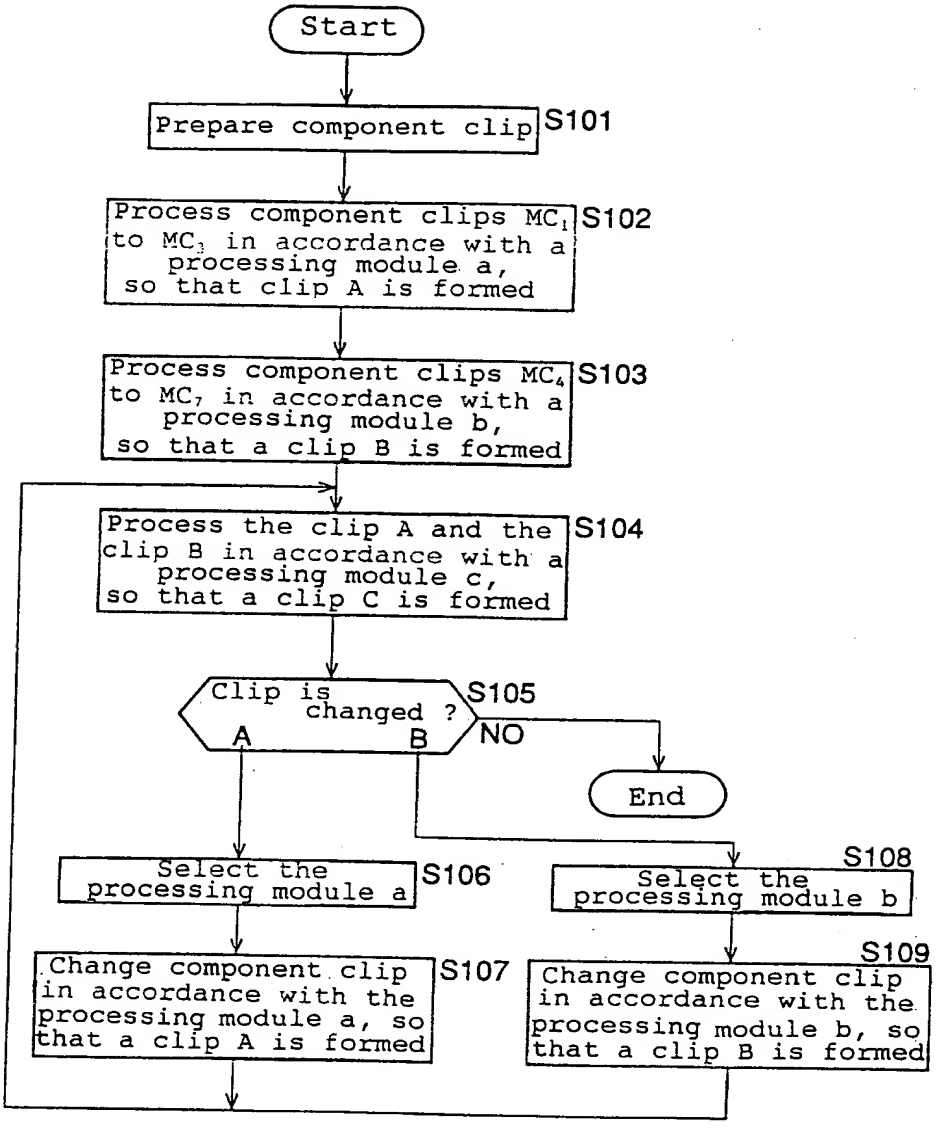

Start rerunning process
Push the uppermost FatClip of edit tree to stack
S81
1
Stack is empty ?
S82
YES
End
NO
One FatClip is popped from the stack, and the resultant clip of FatClip is valid ?
S83
YES
1
NO
The component clips of the popped FatClip are all (ordinary) clips or FatClip having a significant result
S84
YES
S85
FatClip having invalid resultant clip is included in component clips
NO
Push current FatClip to stack
S86
1
Push fat clip having an invalid resultant clip to the stack
S87
1
Editing process is performed to the component clip corresponding to work information, so that a resultant clip is formed

[FIG. 14]

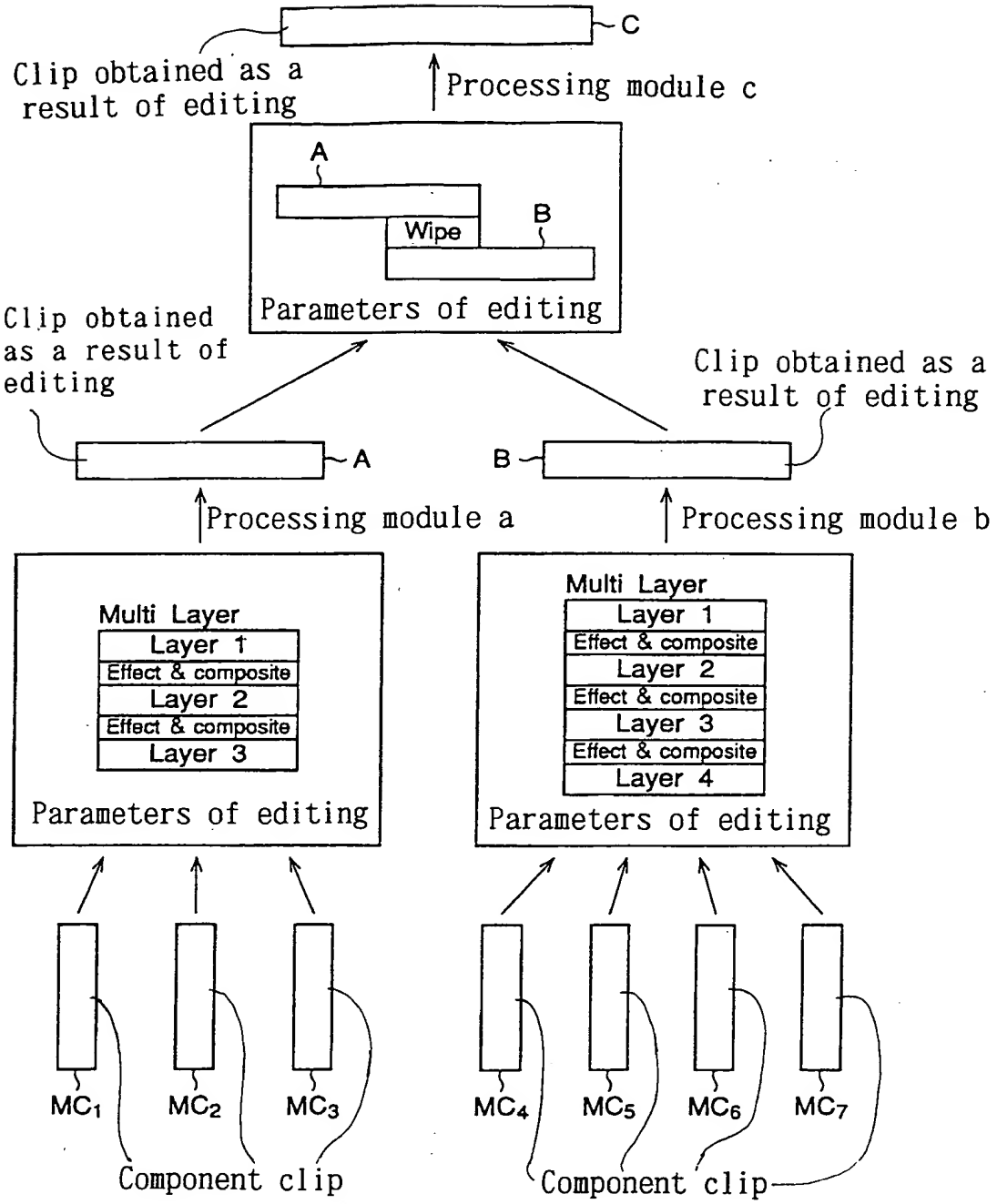


Rerunning process

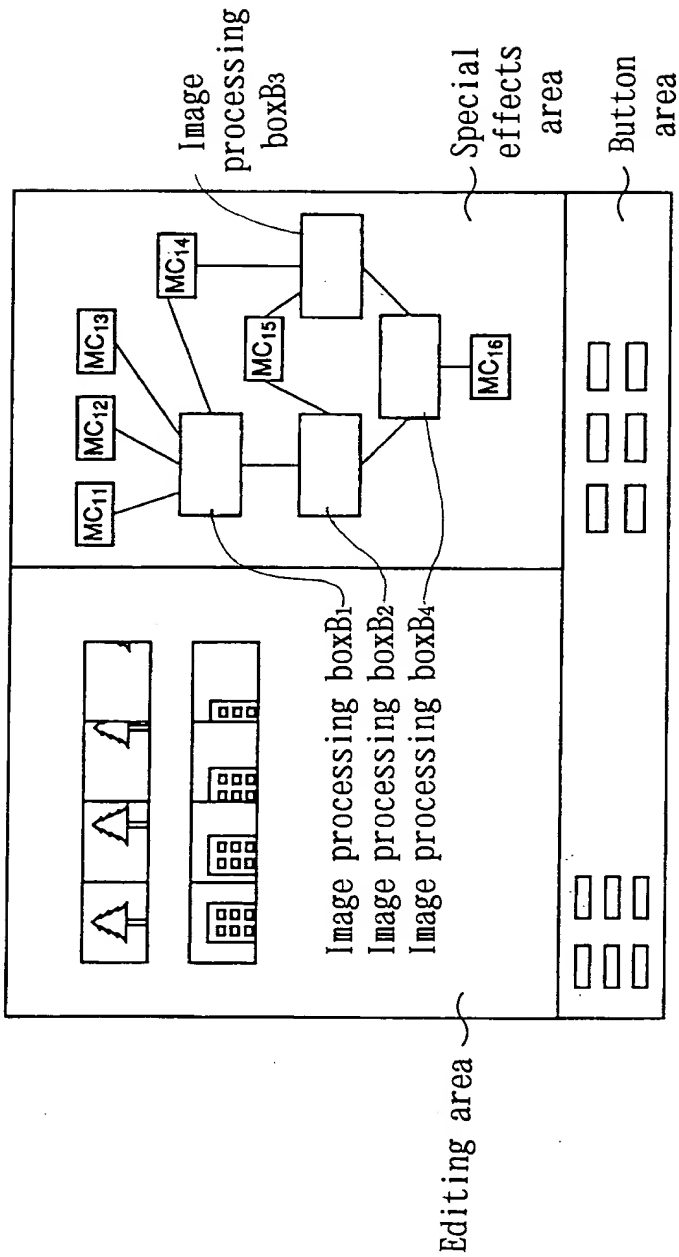
[FIG. 15]


Start
Prepare component clip
S101
Process component clips MC1 to MC3 in accordance with a processing module a, so that clip A is formed
S102
Process component clips MC4 to MC7 in accordance with a processing module b, so that a clip B is formed
S103
Process the clip A and the clip B in accordance with a processing module c, so that a clip C is formed
S104
Clip is changed ?
S105
A
B
NO
End
Select the processing module a
S106
Select the processing module b
S108
Change component clip in accordance with the processing module a, so that a clip A is formed
S107
Change component clip in accordance with the processing module b, so that a clip B is formed
S109

[FIG. 16]


C
Clip obtained as a result of editing
Processing module c
A
Wipe
B
Parameters of editing
Clip obtained as a result of editing
Clip obtained as a result of editing
A
B
Processing module a
Processing module b
Multi Layer
Layer 1
Effect & composite
Layer 2
Effect & composite
Layer 3
Parameters of editing
Multi Layer
Layer 1
Effect & composite
Layer 2
Effect & composite
Layer 3
Effect & composite
Layer 4
Parameters of editing
MC1
MC2
MC3
MC4
MC5
MC6
MC7
Component clip
Component clip

[FIG. 17]



Conventional device

[Name of Document] ABSTRACT

[Abstract]

[Object]

To rapidly and simply perform an editing process.

[Constitution]

When editing, composition and special effect processes are respectively carried out in an editing module EM, a composition module CM or a special effect module SM, a fat clip is formed correspondingly to the process (work) and stored in an edit tree storing part TM. An identifier indicating the module forming the fat clip is stored in the fat clip and the identifier of a component clip is also stored therein. Accordingly, an editing work can be described in a hierarchical structure. When a fat clip in a lower layer of the hierarchical structure is changed, fat clips of upper layers can be automatically newly formed.

[Selected Drawing] Fig. 2